AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Original) A method to reduce emissions in flue gas due to combustion of coal in a combustion unit, said method comprising:

a. combusting coal in a primary combustion zone of the combustion unit;

b. releasing elemental mercury from the combustion into the flue gas;

c. injecting a halogen-containing additive into the flue gas;

d. oxidizing the elemental mercury with a halogen from the halogen-containing additive;

e. adsorbing the oxidized mercury generated by the combustion of the coal with an adsorbent in the flue gas, and

f. collecting the adsorbent with the mercury in a combustion waste treatment system.

2. (Original) A method as in claim 1 wherein the halogen-containing additive is selected from a group consisting of NH_4Cl, NH_4Br and NH_4I.

3. (Original) A method as in claim 1 wherein the coal comprises a coal having a low chlorine content.

4. (Original) A method as in claim 3 wherein the coal having the low chlorine content is a Powder River Basin coal or lignite coal.

5. (Original) A method as in claim 3 wherein the coal having the low chlorine content has less than 100 parts-per-million (ppm) of chlorine.

6. (Original) A method as in claim 1 wherein the combustion waste treatment system includes a particle control device.

7. (Original) A method as in claim 1 wherein the adsorbent is fly ash, and the oxidized mercury is adsorbed on the fly ash.

8. (Original) A method as in claim 1 wherein the adsorbent is activated carbon, and the oxidized mercury is adsorbed on the activated carbon.

9. (Original) A method as in claim 1 further comprising heating the halogen-containing additive with flue gas to generate HCl, HBr or HI and oxidizing the elemental mercury with the HCl, HBr or HI.

10. (Original) A method as in claim 1 further comprising injecting overfire air downstream of the primary combustion zone to generate excessive carbon fly ash and the adsorbent is the fly ash.

11. (Original) A method as in claim 10 wherein the stoichiometric ratio (SR1) in the primary combustion zone is less than 1.1, and the stoichiometric ratio (SR2) at an overfire air injection zone is above 1.0.

12. (Original) A method as in claim 11 wherein SR1 is no greater than 0.8 and SR2 is no less than 1.16.

13. (Original) A method as in claim 1 further comprising coal reburning downstream of the primary combustion zone to form carbon in fly ash generated during combustion, and the fly ash is the adsorbent.

14. (Original) A method as in claim 1 further comprising injecting a nitrogenous reducing agent into the flue gas.

15. (Original) A method as in claim 14 further comprising a catalytic surface for NOx and mercury oxidation.

16. (Original) A method as in claim 1 wherein the halogen containing additive is injected where the flue gas is in a temperature range of 1600^0 F to 2300^0 F.

17. (Original) A method as in claim 1 wherein the halogen containing additive is injected where the flue gas is in a temperature range of 1750^0 F to 1950^0 F.

18. (Original) A method as in claim 1 wherein an amount of halogen injected into the flue gas by the halogen containing additive is in the range of 1 to 200 parts per million.

19. (Original) A method as in claim 1 wherein the halogen containing additive is injected in an aqueous solution into the flue gas.

20. (Original) A method as in claim 19 wherein the halogen containing additive is injected in the solution further comprising NH_4OH.

21. (Original) A method as in claim 19 wherein the halogen containing additive is injected in the solution further comprising urea.

22. (Original) A method as in claim 1 wherein the mercury released from combustion is mostly elemental mercury (Hg^0) and further comprising oxidizing the elemental mercury as the flue gases cools.

23. (Original) A method as in claim 22 wherein the oxidized mercury is removed from flue gas in a scrubber.

24. (Original) A method as in claim 1 further comprising injecting an aqueous solution of the halogen containing additive with a carrier gas.

25. (Original) A method as in claim 24 wherein the carrier gas is at least one of air, recycled flue gas and nitrogen gas.

26. (Original) A method to reduce mercury in gas emissions from the combustion of coal in a combustion system, said method comprising:

a. combusting the coal in a primary combustion zone of the combustion system, wherein elemental mercury (Hg^0) is released in the flue gas produced by the combustion;

b. staging combustion air supplied to the combustion system by adding a portion of the combustion air to the primary combustion zone and a second portion of the combustion air to an overfire air zone downstream of the combustion zone;

c. maintaining stoichiometric ratio in the primary combustion zone of no greater than 1.1 so as to form active carbon in the fly ash generated by the combustion of coal;

d. oxidizing the elemental mercury by injection of a halogen containing additive in the flue gas to generate oxidized mercury (Hg^{+2});

e. adsorbing the oxidized mercury in the flue gas by the active carbon in the fly ash, and

f. collecting the fly ash with adsorbed mercury in a combustion waste treatment system.

27. (Original) A method as in claim 26 wherein the halogen containing additive is selected from a group consisting of NH_4Cl, NH_4Br and NH_4I.

28. (Original) A method as in claim 26 wherein the combustion waste treatment system comprises a particle control device capturing the fly ash with adsorbed mercury and discharging the captured fly ash to a fly ash collection unit.

29. (Original) A method as in claim 26 wherein the combustion waste treatment system comprises a particle control device capturing the fly ash after the fly ash cools to a temperature no greater than 400 degrees Fahrenheit.

30. (Original) A method as in claim 26 further comprising coal reburning in the combustion system to form carbon in the fly ash generated during combustion.

31. (Original) A method as in claim 30 wherein an amount of reburning fuel used during the coal reburning is in a range of about 10 to about 30 percent of a total heat input of fuel used for the combustion.

32. (Original) A method as in claim 30 wherein an amount of reburning fuel used during the coal reburning is in a range of about 15 to about 25 percent of a total heat input of fuel used for the combustion.

33. (Withdrawn) A method as in claim 26 wherein combustion occurs in a low nitrogen oxide (NOx) burner.

34. (Withdrawn) A system to treat mercury in flue gas emissions from a coal fired furnace comprising:

a primary combustion zone receiving combustion air;

a coal injector adapted to inject coal into the primary combustion zone;

an air injector adapted to introduce combustion oxygen into the primary combustion zone;

a downstream passage of the primary combustion zone for flue gases and fly ash generated during combustion;

an injector in the downstream passage for injecting a halogen containing additive;

a combustion treatment waste system coupled to a flue gas output of the downstream passage and to a discharge for captured particulate waste, and

wherein said primary combustion zone burns the coal, and elemental mercury released in the flue gas reacts with the injected halogen containing additive to oxidize the mercury.

35 (Withdrawn). A system as in claim 33 wherein halogen containing additive is selected from a group consisting of NH_4Cl, NH_4Br and NH_4I.

36 (Withdrawn) A system as in claim 34 wherein the downstream passage comprises a duct downstream of the primary combustion zone to cool the flue gas and collect fly ash with the absorbed mercury.

37 (Withdrawn). A system as in claim 34 further comprising an overfire air burnout zone downstream of the combustion zone and included in the downstream passage, wherein combustion air is injected into the burnout zone.

38 (Withdrawn) A system as in claim 34 wherein the injector for the halogen containing additive further comprises a nozzle spraying an aqueous solution of halogen-containing additive in the flue gas.